Type AVGA –40 °C to +105 °C

High Capacitance SMT Aluminum Electrolytic Capacitors

For Filtering, Bypassing and Power Supply Decoupling with High Capacitance Requirements

Type AVGA Capacitors are rated for 2000 hours at 105 ºC and up to 63 Vdc. They are ideal for high density PC board packaging. The Type AVGA offers a low in-place-cost for a high quality performer. The vertical cylindrical cases facilitate automatic mounting and reflow soldering into the same footprint of like-rated tantalum capacitors except without the need for voltage derating. Type AVGA is RoHS compliant.

Highlights

- +105 °C, Up to 2000 Hours Load Life
- Capacitance Range: 0.1 µF to 4700 µF
- Voltage Range: 6.3 Vdc to 63 Vdc

Specifications

Operating Temperature: –40 °C to +105 °C

Rated Voltage: 6.3, 10, 16, 25, 35, 50, 63 Vdc

Capacitance: 0.1µF to 4700 µF

Capacitance Tolerance: ±20% @ 120 Hz and +20 °C

Leakage Current (at 20 ºC):

6.3 – 63 V	4 – 10 Ø	I = 0.01 CV or 3 µA, whichever is greater, after 2 minutes at +20 ºC
	12.5 ~ 16 Ø	I = 0.03 CV or 4 µA, whichever is greater, after 2 minutes at +20 ºC

I = leakage current C = rated capacitance in µF V = rated DC Working voltage in V

Dissipation Factor: (Tan δ at 120 Hz, 20 ºC)

Rated Voltage	6.3	10	16	25	35	50	63
4 ~ 10 Ø	0.45	0.35	0.28	0.18	0.16	0.14	0.12
12.5 ~ 16 Ø	0.4	0.38	0.34	0.26	0.22	0.18	0.14

When the capacitance exceeds 1000 µF, .02 shall be added for every 1000 µF increase

Low Temperature Characteristic (at 120 Hz):

Rated Voltage			6.3	10	16	25	35	50	63
Impedance Ratio	Z(–25 ºC)	4 ~ 10 Ø	4	3	2	2	2	2	2
	/Z(+20 ºC)	12.5 ~ 16 Ø	5	4	3	2	2	2	2
	Z(–40 ºC)	4 ~ 10 Ø	12	8	6	4	3	3	3
	/Z(+20 ºC)	12.5 ~ 16 Ø	10	8	6	4	3	3	3

Impedance ratio shall not exceed the values given in the table above.

Load Life Test:

Test Time	2,000 Hours
Capacitance Change	4 ~ 6.3 Ø : Within ±25 % of initial value
	8 ~ 16 Ø : Within ±20 % of initial value
Dissipation Factor	< 200% of specified value
Leakage Current	Within specified value

* The above specifications shall be satisfied when the capacitors are restored to 20 ºC after the rated voltage is applied for 2,000 hrs at 105 ºC

RoHS Compliant

Shelf LifeTest: Test time: 1000 hours; other items are the same as those for life test.

Complies with the EU Directive 2002/95/EC requirement restricting the use of Lead (Pb), Mercury (Hg), Cadmium (Cd), Hexavalent chromium (Cr(VI)), PolyBrominated Biphenyls (PBB) and PolyBrominated Diphenyl Ethers (PBDE).

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Outline Drawings, Case Code & Dimensions Table

Fig. 1

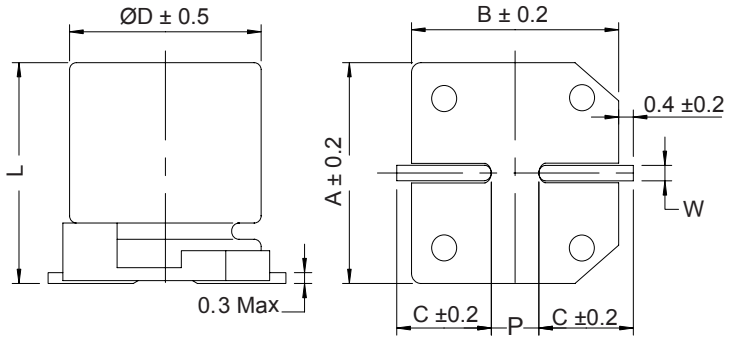
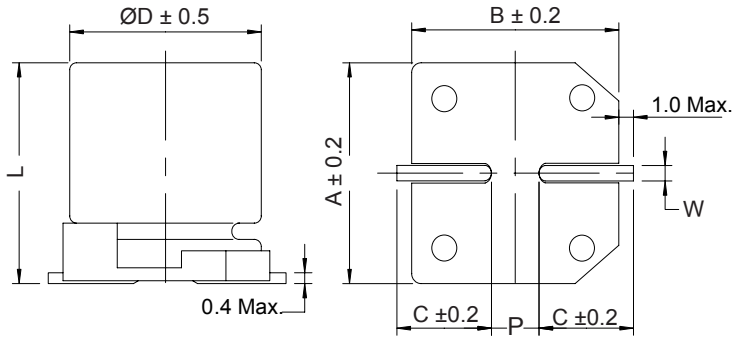


Fig. 2



Case Code	Ø D (mm)	L (mm)	A (mm)	B (mm)	C (mm)	W (mm)	P ±0.2 (mm)	Fig. No.
B	4.0	5.7 ±0.3	4.3	4.3	2.0	0.5 to 0.8	1.0	1
C	5.0	5.7 ±0.3	5.3	5.3	2.3	0.5 to 0.8	1.5	1
D	6.3	5.7 ±0.3	6.6	6.6	2.7	0.5 to 0.8	2.0	1
X	6.3	7.7 ±0.3	6.6	6.6	2.7	0.5 to 0.8	2.0	1
F	8.0	10 ±0.5	8.4	8.4	3.0	0.7 to 1.1	3.1	1
G	10.0	10 ±0.5	10.4	10.4	3.3	0.7 to 1.1	4.7	1
Q	10.0	10.3 ±0.5	10.4	10.4	3.3	0.7 to 1.1	4.7	1
H	12.5	13.5 ±0.5	12.8	12.8	4.9	1.1 to 1.4	4.2	2
L	12.5	16 ±0.5	12.8	12.8	4.9	1.1 to 1.4	4.2	2
P	16.0	16.5 ±0.5	16.3	16.3	5.8	1.1 to 1.4	6.0	2

Part Numbering System

AVGA	227	M	25	F	24T	–F
Type	Capacitance	Capacitance Tolerance	Voltage Code	Case Code	Packaging Code	RoHs Compliant
AVGA	104 = .1 µF 475 = 4.7 µF 106 = 10.0 µF 227 = 220 µF 478 = 4700 µF	M = ±20%	06 = 6.3 Vdc 10 = 10 Vdc 16 = 16 Vdc 25 = 25 Vdc 35 = 35 Vdc 50 = 50 Vdc 63 = 63 Vdc	See Table	24 = Carrier tap Width (mm) T = Tape & Reel Y = Tray Pack (available for H,L, & P case codes)	

Type AVGA –40 °C to +105 °C

High Capacitance SMT Aluminum Electrolytic Capacitors

Ratings

Cap (µF)	Catalog Part Number	Max. DCL (µA)	Max. DF @ 120 Hz	Max. ESR @ 120 Hz/20 °C (ohms)	Max. Ripple Current @ 120 Hz/105 °C (ma)	Case Code	Size D x L (mm)	Quantity Per Reel (ea)
6.3 Vdc (8 Vdc Surge)								
47	AVGA476M06C12T-F	3.0	0.45	15.87	30	C	5x5.7	1000
100	AVGA107M06D16T-F	6.3	0.45	7.46	69	D	6.3x5.7	1000
220	AVGA227M06X16T-F	14	0.45	3.39	120	X	6.3x7.7	1000
330	AVGA337M06F24T-F	21	0.45	2.26	290	F	8x10	500
470	AVGA477M06F24T-F	30	0.45	1.59	320	F	8x10	500
1000	AVGA108M06G24T-F	63	0.45	0.75	410	G	10x10	500
2200	AVGA228M06H32T-F	416	0.42	0.32	680	H	12.5x13.5	200
3300	AVGA338M06L32T-F	624	0.44	0.22	850	L	12.5x16	150
4700	AVGA478M06P44T-F	888	0.46	0.16	1000	P	16x16.5	125
10 Vdc (13 Vdc Surge)								
33	AVGA336M10C12T-F	3.3	0.35	17.58	30	C	5x5.7	1000
47	AVGA476M10D16T-F	4.7	0.35	12.35	48	D	6.3x5.7	1000
100	AVGA107M10D16T-F	10	0.35	5.80	69	D	6.3x5.7	1000
220	AVGA227M10X16T-F	22	0.35	2.64	120	X	6.3x7.7	1000
330	AVGA337M10F24T-F	33	0.35	1.76	290	F	8x10	500
470	AVGA477M10F24T-F	47	0.35	1.23	320	F	8x10	500
470	AVGA477M10G24T-F	47	0.35	1.23	410	G	10x10	500
1000	AVGA108M10Q24T-F	100	0.35	0.58	410	Q	10x10.3	500
2200	AVGA228M10L32T-F	660	0.40	0.30	750	L	12.5x16	150
3300	AVGA338M10P44T-F	990	0.42	0.21	1000	P	16x16.5	125
4700	AVGA478M10P44T-F	1410	0.44	0.16	1000	P	16x16.5	125
16 Vdc (20 Vdc Surge)								
10	AVGA106M16B12T-F	3.0	0.28	46.42	17	B	4x5.7	2000
22	AVGA226M16C12T-F	3.5	0.28	21.10	30	C	5x5.7	1000
33	AVGA336M16D16T-F	5.3	0.28	14.07	45	D	6.3x5.7	1000
47	AVGA476M16D16T-F	7.5	0.28	9.88	48	D	6.3x5.7	1000
100	AVGA107M16D16T-F	16	0.28	4.64	69	D	6.3x5.7	1000
220	AVGA227M16X16T-F	35	0.28	2.11	120	X	6.3x7.7	1000
330	AVGA337M16F24T-F	53	0.28	1.41	290	F	8x10	500
470	AVGA477M16F24T-F	75	0.28	0.99	320	F	8x10	500
1000	AVGA108M16H32T-F	480	0.34	0.56	550	H	12.5x13.5	200
2200	AVGA228M16P44T-F	1056	0.36	0.27	950	P	16x16.5	125
3300	AVGA338M16P44T-F	1584	0.38	0.19	950	P	16x16.5	125
25 Vdc (32 Vdc Surge)								
4.7	AVGA475M25B12T-F	3.0	0.18	63.49	13	B	4x5.7	2000
10	AVGA106M25C12T-F	3.0	0.18	29.84	23	C	5x5.7	1000
22	AVGA226M25D16T-F	5.5	0.18	13.56	38	D	6.3x5.7	1000
33	AVGA336M25D16T-F	8.3	0.18	9.04	50	D	6.3x5.7	1000
47	AVGA476M25D16T-F	12	0.18	6.35	60	D	6.3x5.7	1000
100	AVGA107M25X16T-F	25	0.18	2.98	100	X	6.3x7.7	1000
220	AVGA227M25F24T-F	55	0.18	1.36	320	F	8x10	500
330	AVGA337M25G24T-F	83	0.18	0.90	375	G	10x10	500
470	AVGA477M25G24T-F	118	0.18	0.64	410	G	10x10	500
1000	AVGA108M25L32T-F	750	0.26	0.43	550	L	12.5x16	150
2200	AVGA228M25P44T-F	1650	0.28	0.21	820	P	16x16.5	125

Contact factory for tray pack (Y) quantities

Type AVGA –40 °C to +105 °C

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Cap (µF)	Catalog Part Number	Max. DCL (µA)	Max. DF @ 120 Hz	Max. ESR @ 120 Hz/20 ºC (ohms)	Max. Ripple Current @ 120 Hz/105 ºC (ma)	Case Code	Size D x L (mm)	Quantity Per Reel (ea)
35 Vdc (44 Vdc Surge)								
4.7	AVGA475M35B12T-F	3.0	0.16	56.44	16	B	4x5.7	2000
10	AVGA106M35C12T-F	3.5	0.16	26.53	27	C	5x5.7	1000
22	AVGA226M35D16T-F	7.7	0.16	12.06	44	D	6.3x5.7	1000
33	AVGA336M35D16T-F	12	0.16	8.04	54	D	6.3x5.7	1000
47	AVGA476M35X16T-F	16	0.16	5.64	80	X	6.3x7.7	1000
100	AVGA107M35F24T-F	35	0.16	2.65	320	F	8x10	500
220	AVGA227M35G24T-F	77	0.16	1.21	375	G	10x10	500
330	AVGA337M35Q24T-F	116	0.16	0.80	410	Q	10x10.3	500
470	AVGA477M35H32T-F	494	0.22	0.78	520	H	12.5x13.5	200
1000	AVGA108M35P44T-F	1050	0.22	0.36	750	P	16x16.5	125
50 Vdc (63 Vdc Surge)								
0.1	AVGA104M50B12T-F	3.0	0.14	2320.96	2	B	4x5.7	2000
0.22	AVGA224M50B12T-F	3.0	0.14	1054.98	3	B	4x5.7	2000
0.33	AVGA334M50B12T-F	3.0	0.14	703.32	4	B	4x5.7	2000
0.47	AVGA474M50B12T-F	3.0	0.14	493.82	5	B	4x5.7	2000
1.0	AVGA105M50B12T-F	3.0	0.14	232.10	10	B	4x5.7	2000
2.2	AVGA225M50B12T-F	3.0	0.14	105.50	16	B	4x5.7	2000
3.3	AVGA335M50B12T-F	3.0	0.14	70.33	18	B	4x5.7	2000
4.7	AVGA475M50C12T-F	3.0	0.14	49.38	20	C	5x5.7	1000
10	AVGA106M50D16T-F	5.0	0.14	23.21	32	D	6.3x5.7	1000
22	AVGA226M50D16T-F	11	0.14	10.55	47	D	6.3x5.7	1000
33	AVGA336M50X16T-F	17	0.14	7.03	65	X	6.3x7.7	1000
47	AVGA476M50X16T-F	24	0.14	4.94	80	X	6.3x7.7	1000
100	AVGA107M50F24T-F	50	0.14	2.32	230	F	8x10	500
100	AVGA107M50G24T-F	50	0.14	2.32	375	G	10x10	500
220	AVGA227M50Q24T-F	110	0.14	1.06	375	Q	10x10.3	500
330	AVGA337M50H32T-F	165	0.18	0.90	500	H	12.5x13.5	200
470	AVGA477M50L32T-F	235	0.18	0.64	550	L	12.5x16	150
63 Vdc (79 Vdc Surge)								
0.47	AVGA474M63B12T-F	3.0	0.12	423.27	5	B	4x5.7	2000
1	AVGA105M63B12T-F	3.0	0.12	198.94	8	B	4x5.7	2000
2.2	AVGA225M63B12T-F	3.0	0.12	90.43	12	B	4x5.7	2000
3.3	AVGA335M63C12T-F	3.0	0.12	60.28	17	C	5x5.7	1000
4.7	AVGA475M63D16T-F	3.0	0.12	42.33	22	D	6.3x5.7	1000
10	AVGA106M63D16T-F	6.3	0.12	19.89	32	D	6.3x5.7	1000
22	AVGA226M63X16T-F	14	0.12	9.04	58	X	6.3x7.7	1000
33	AVGA336M63F24T-F	21	0.12	6.03	140	F	8x10	500
47	AVGA476M63F24T-F	30	0.12	4.23	170	F	8x10	500
47	AVGA476M63G24T-F	30	0.12	4.23	310	G	10x10	500
100	AVGA107M63Q24T-F	63	0.12	1.99	310	Q	10x10.3	500
220	AVGA227M63H32T-F	416	0.14	1.06	470	H	12.5x13.5	200
330	AVGA337M63P44T-F	624	0.14	0.70	700	P	16x16.5	125
470	AVGA477M63P44T-F	888	0.14	0.49	700	P	16x16.5	125

Contact factory for tray pack (Y) quantities

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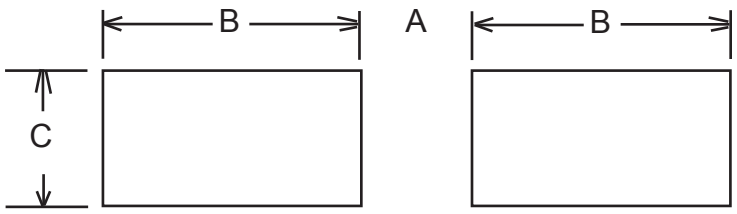
Recommended Land Patterns by case size for AVGA series



Case Code	Case Size	Land Dimensions (mm)		
		C	B	A
B	4x5.7	1.6	2.6	1
C	5x5.7	1.6	3	1.4
D	6.3x5.7	1.6	3.5	1.9
X	6.3x7.7	1.6	3.5	1.9
F	8x10	2.5	3.5	3
G	10x10	2.5	4	4
Q	10x10.3	2.5	4	4
H	12.5x13.5	4	7.5	7
L	12.5x16	4	7.5	7
P	16x16.5	6	8.5	9.5

Type AVGA –40 °C to +105 °C

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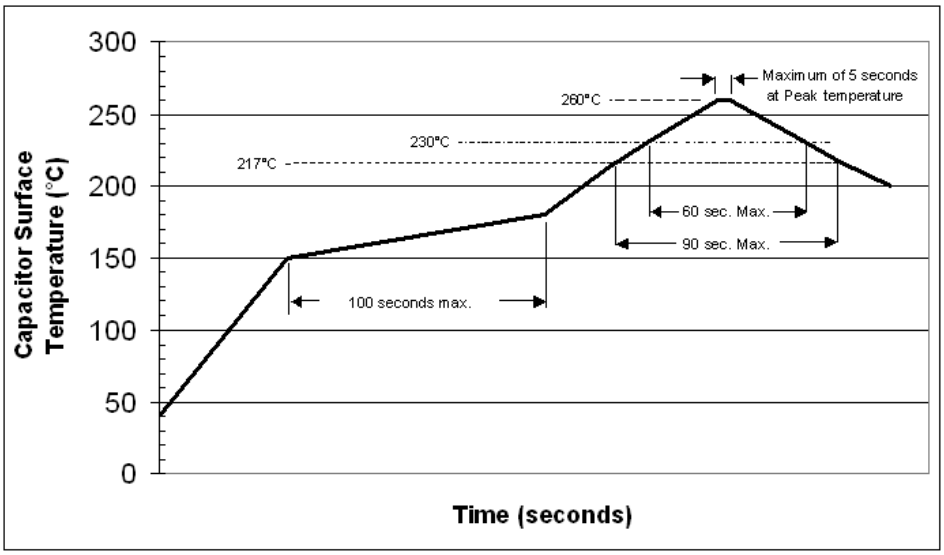
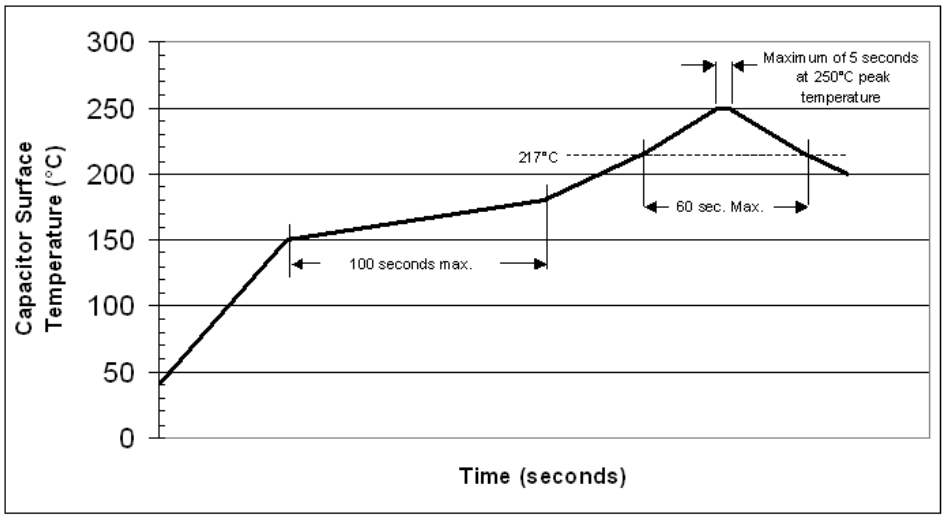
Recommended Soldering Methods

Recommended Reflow Soldering Profile:

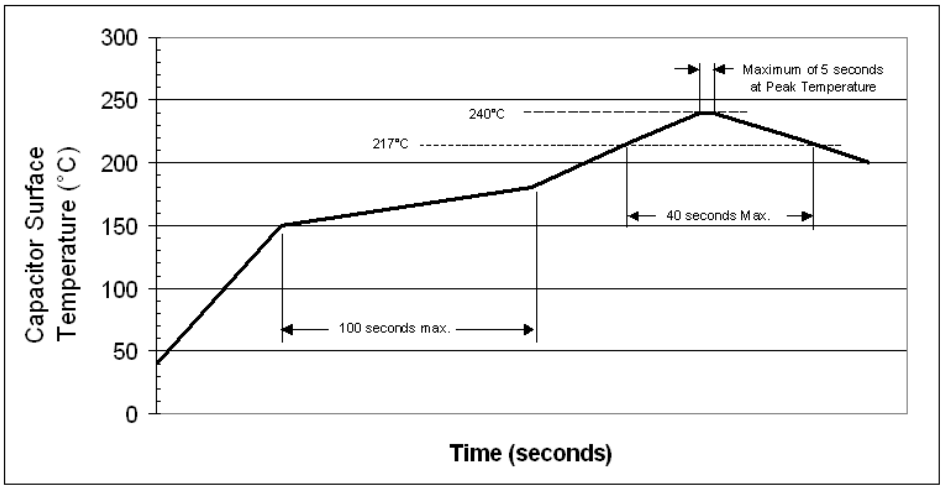
For case diameters
4 thru 6.3 mm with voltage
ratings of 6.3 to 50Vdc



For case diameters
4 thru 6.3 mm with a volt-
age rating of 63 Vdc



For case diameters
8 to 16 mm



Case sizes 4 thru 6.3 mm dia. (4 to 50V) should be subjected to just one reflow soldering process.
The 8 thru 16 mm dia. case sizes(and 4 thru 6.3 mm dia. at 63V) should be subjected to a maximum of two reflow soldering processes.

Soldering with a solder iron should be performed with a maximum soldering iron tip temperature of 350±5°C for 3 to 4 seconds.